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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/672,269	09/26/2003	Scott G. Walton	NC 83,217	8821

26384 7590 12/22/2005

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EXAMINER

BUEKER, RICHARD R

ART UNIT PAPER NUMBER

1763

DATE MAILED: 12/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/672,269

Applicant(s)

WALTON ET AL.

Examiner

Richard Bueker

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 October 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) 9-13 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 and 14-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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Claim 4 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claim 4 recites the inclusion of "halogen bases gases" and also the inclusion of "non-halogen gases" which requires the presence of a gas mixture. The recited mixture of gas is not enabled because the specification fails to disclose any gas mixture compositions. In claim 4, the phrase "non-halogen gases" is not found in the specification.

Claims 1-8 and 14-16 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. In claim 8, the phrase "up to approximately 3000 ev" was not in the specification as filed and is new matter. In claim 1, the phrase "a continuous high energy electron beam" was not in the specification as originally filed and is new matter. In claim 14, the phrase "an ion extractor operable to remove negative ions from the plasma" was not in the specification as filed and is new matter.

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: In claim 4, the phrase "non-halogen gases" is not found in

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the specification. In their response, applicants state that "non-halogen gases" has been added to the specification, but it is not clear where in the specification it was added. In claim 8, the phrase "up to approximately 3000 ev" is not found in the specification. matter. In claim 1, the phrase "a continuous high energy electron beam" is not found in the specification. In claim 14, the phrase "an ion extractor operable to remove negative ions from the plasma" is not in the specification.

The amendment filed Sept. 14, 2005 is objected to under 35 U.S.C. 132(a) because it introduces new matter into the disclosure. 35 U.S.C. 132(a) states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: In the paragraph beginning on page 6, line 1, the originally filed disclosure of "means for shaping the high energy electron beam" has been deleted and replaced with the new phrase of "the high energy electron beam confiner". This change causes the meaning of applicants' disclosure to be changed and therefore it is new matter. Applicant is required to cancel the new matter in the reply to this Office Action.

Claims 1-8 and 14-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The term "high energy electron beam" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. It is noted that the specification fails to disclose any numerical value for "high energy electron beam". In claim 2, the phrase "dissociating

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the gas molecules the plasma electrons, and positive ions” is non-idiomatic, unclear and indefinite.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-8 and 14-16 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Walton I (Applied Physics Letters vol. 81, no. 6, pp. 987-989, published August 5, 2002) (see Fig. 1), who discloses an electron beam plasma source comprising a chamber containing halogen gas, an electron source operable to produce a high energy electron beam and an electron beam confiner. Walton teaches (page 987, para. Bridging cols. 1 and 2) that e-beam generated plasmas produce continuous ion-ion plasmas. Walton reports (page 989, last para.) that positive and negative ions can be extracted during all phases of plasma production. Therefore, the apparatus of Walton is inherently an ion-ion plasma source as recited. It is noted also that the “wherein” clauses in claim 1, lines 5-7 and lines 10-14, all of claim 2, claim 14, lines 1-4, lines 15-18, and lines 20-22, claim 15, lines 9-15 and all of claim 16, are process limitations that the apparatus of Walton is

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inherently capable of performing. Also, Ex parte Thibault, 164 USPQ 666, indicates that the purpose to which an apparatus is to be put and expressions relating an apparatus to contents thereof during intended operation are not significant in determining patentability of an apparatus claim. Therefore, the recited halogen gas and the substrate with masking material of claim 14 do not so limit the recited apparatus claims. Also, the electrode of Walton is inherently capable of supporting a substrate to the extent required by claim 6. regarding newly added claim 16, Walton teaches (see page 987, third paragraph) that it is desirable to use an electron temperature of less than 1 ev in plasmas that are intended for forming negative ions. Further regarding claim 16, it is noted that a temperature is a process limitation that does not so limit an apparatus claim.

Claims 1-8 and 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walton I (Applied Physics Letters vol. 81, no. 6, pp. 987-989, published August 5, 2002) taken in further view of Neger (5,874,807), Shimizu (5,413,663) and applicants' description of the prior art. Neger (col. 1, lines 12-13) and Shimizu (abstract and col. 8, lines 56-68) both teach the use of an electron beam plasma to etch a substrate. Shimizu specifies halogen gases such as Cl_2 and CF_4 . Also, applicants' description of the prior art (page 1, lines 11-13 of applicants' specification) teaches that the use of a masked substrate for etching is conventional. If, for argument's sake, the claims were considered to require a halogen gas and a masked substrate, it would have been obvious to provide them in the apparatus of Walton, in view of Neger, Shimizu and applicants' description of the prior art.

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Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walton I (Applied Physics Letters vol. 81, no. 6, pp. 987-989, published August 5, 2002) taken in further view of Neger (5,874,807), Shimizu (5,413,663) and applicants' description of the prior art as stated above, taken in further view of Savas (5,983,828) (col. 8, lines 23-25) who teaches the use of a mixture of halogen based gas and argon for etching in an ion-ion plasma, and it would have been obvious to use the mixture of Savas to etch in an electron beam plasma as taught by Neger and Shimizu.

Regarding applicants' IDS filed May 7, 2004, the last citation on page 1 (Walton et al., "Ion flux and energy distributions at electrode surfaces in LAPPS", Pulsed Power Plasma science, 2001. IEEE conference Record – Abstracts, 17-22, page 385 (June 2001)) has not been initialed, because it is unclear what the notation "17-22" refers to. Only one page (numbered 385) was submitted. If this reference includes more pages they should be submitted to clarify the record.

Applicants have indicated in their response that claims 1-8, 14 and 15 were rejected over Ohtake, Kitagawa and Savas. It is noted, however, that only claims 14 and 15 were rejected based on these references in the previous office action.

Applicants' response filed Sept. 14, 2005 fails to include any discussion of the rejection of claims 1-8, 14 and 15 under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Walton I (Applied Physics Letters vol. 81, no. 6, pp. 987-989, published August 5, 2002).

Regarding the rejection of claims 1-8, 14 and 15 under 35 U.S.C. 103(a) as being unpatentable over Walton I (Applied Physics Letters vol. 81, no. 6, pp. 987-989,

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published August 5, 2002) taken in further view of Neger (5,874,807), Shimizu (5,413,663) and applicants' description of the prior art, applicants have argued that "the results disclosed by Walton I employed a hollow (sic) cathode type source, which can't be maintained in an energized state for a continuous time period as the present invention of amended independent claim 1 and 14". It is noted, however, that this argument is not relevant to the presently pending claims. None of the claims as written include any limitation relating to a 'continuous time period' of any length. It is noted that claims 14 and 15 do not contain any limitation relating to anything that is "continuous", be it a plasma, an ion-ion plasma, or an electron beam. Regarding claim 1, it is noted that this claim recites the newly added limitation of "a continuous high energy electron beam", but this newly added language cannot be found anywhere in applicants' specification, and appears to be new matter. Applicants are respectfully requested to point out where in their specification as originally filed support for this limitation can be found.

It is noted also that while applicants' are now arguing that the Walton I hollow cathode "can't be maintained in an energized state for a continuous time period as the present invention of amended independent claim 1 and 14", applicants' own preferred embodiment as illustrated in Fig. 2 of their specification is a hollow cathode electron source (see also page 9, lines 8-12 of applicants' specification). Applicants are requested to clarify for the record whether their present claims 1-8 and 14-16 do or do not include their hollow cathode embodiment as illustrated in Fig. 2 of their specification.

Applicants have also argued that the electron beam plasma apparatus of Neger ionizes a background gas thereby producing an electron/ion plasma. It is noted, however, that the Neger apparatus uses the same electron beam forming means that applicants use. Neger teaches that his electron beam plasma apparatus can operate at the same e-beam strength as that used by applicants. There is no evidence of record that his electron beam plasma apparatus is different from that of applicants. Regarding the issue of Neger's ionizing a background gas, it is noted that applicants' specification fails to even disclose what gases applicants intend to use in their gas mixture that is claimed in claim 4, so there is no way for one skilled in the art to know if applicants are intending to ionize a background gas or not. Further regarding applicants' arguments with respect to Neger, it is noted also that applicants' apparatus also produces a plasma with electrons and ions, and applicants' apparatus can also quite properly be characterized as "producing an electron/ion plasma". Therefore, this argument does not distinguish applicants' apparatus from Neger's apparatus.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the

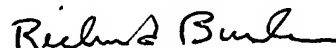
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shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard Bueker whose telephone number is (571) 272-1431. The examiner can normally be reached on 9 AM - 5:30 PM, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parvis Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Richard Bueker
Primary Examiner
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